

REMARKS

The Examiner has rejected claims 1 – 3, 5 and 6 under 35 USC 102(b) as being anticipated by Waldron et al. (US 6 227 433 B1), she has rejected furthermore claims 1 – 6 and 10 under 35 USC 102(c) as being anticipated by Murakami (US 6 789 722 B21, she has rejected claims 1 – 7 and 10 under 35 USC 102 (c) as being anticipated by Enomoto et al. (US 6 344 117) and she has rejected claims 1 – 8 and 10 under 35 USC 102(e) as being anticipated by Trapp et al. (US 6 676 008 131).

Claim 1 of the present application resides in a method for joining at least two work pieces (13, 14) by friction stir welding using a rotating tool (10) with a pin-like projection (11), comprising the steps of:

[a] placing said at least two work pieces (13, 14) on top of one another such that the areas to be joined are disposed adjacent one another,

[b] moving said rotating tool (10) onto the uppermost work piece (13) in the area where the work pieces are to be joined such that said pin-like projection (11) engages said uppermost work piece (13) and, while being pressed against said work piece, generates friction heat to at least plasticize the material of said uppermost work piece (13),

[c] moving said rotating tool (10) axially toward the lowermost work piece (14) through the material being plasticized until it contacts the top surface of the lowermost work piece (14), and

[d] then removing said rotating tool (10).

Waldron et al. (US 5 227 433 B1): In contrast to the Examiner's opinion, this document does not disclose a method wherein a friction welding tool passes through a first workpiece and, upon contacting a second workpiece disposed below the first workpiece, is stopped in its axial movement and again removed from the workpiece.

Rather, it is known from the document to introduce a rotating rivet-like element into two workpieces disposed on top of one another so that a friction weld connection is formed

between the rivet-like element on one hand and the workpieces on the other hand, wherein this connection is similar to a rivet connection.

Another difference resides in the fact that the lower workpiece is plasticized in the method disclosed in Waldron et al., whereas this is not the case with the method according to the invention.

Waldron et al. is therefore not a suitable document to question the novelty of present claim 1.

Murakami (US 6 789 722 B2): This document discloses a method for establishing a spot-like friction welding connection between two workpieces disposed on top of one another (see in this connection Figs. 1a and 1b as well as the description column 5, lines 15 to 65). In the method disclosed, a rotating pin (3) is pressed into the workpieces (W1, W2) whereby friction heat is generated in order to plasticize the material of the workpieces and particularly of the upper workpiece. Different however from the method according to the present invention, the pin also enters the lower workpiece (W2) and the axial movement of the pin (3) is not stopped upon contact with the upper surface of the lower workpiece (W2). Consequently, this document does not disclose at least the feature [c]) of claim 1 of the present application.

Therefore also Murakami does not anticipate the subject matter of present claim 1.

Enomoto et al. (US 6 344 117 B2): This document concerns a support plate for a sputter target, wherein the support plate comprises a base plate (2) and a cooling plate (3). As apparent from the section between column 6, line 34 and column 7, line 20, this document discloses, for the connection of the two plates (2, 3), the use of a rotating pin (11) (see Fig. 4), which is pressed into the plates disposed on top of one another and which is then moved along the weld seams (W1, W2). As apparent from Fig. 4 as well as column 6, lines 58 to 61, the pin is pressed into the cooling plate as well as into the base plate and the axial movement thereof is not stopped upon contact with the surface of the base plate.

Consequently, also this document does not disclose that the rotating piece is pressed into the upper workpiece only until it contacts the surface of the lower workpiece. Therefore the subject matter of present claim 1 is also novel with regard to this document.

Trapp et al. (US 6 676 008 B1): This document discloses to connect two or, respectively, three workpieces along on L-shaped or, respectively, T-shaped jointure by friction welding. In contrast to the present invention, this method is not directed to the jointure of an overlap joint but a jointure along a butt joint.

In an L-shaped joint, the pin comes into contact with the first workpiece and also the second workpiece already upon placement of the pin onto the workpieces and is subsequently moved along the butt joint (see Fig. 2). Consequently, the feature of the present claim 1 that the pin is moved toward the lower workpiece until it is in contact with the surface of the lower workpiece is not disclosed.

Also, if in the connection shown in Fig. 5, along a T-shaped joint instead of two workpieces (72a, 72b) a single workpiece is used (see column 5, lines 62 to 64), the pin enters according to this document also into the third workpiece (70) (see column 5, lines 64 to 66). Consequently, also with this alternative arrangement the feature (3) of the present claim is not disclosed.

The subject matter of the present claim 1 is therefore novel also with regard to this document.

In contrast to the assessment of the Examiner, Applicants, after careful examination of the state of the art cited by the Examiner cannot agree with the Examiner but rather assert that the state of the art does not anticipate the subject matter according to the present claim 1.

Reconsideration of the Examiner's rejection of claim 1 under 35 USC 102 is therefore respectfully requested.

Furthermore, none of the documents cited by the Examiner discloses or suggests that the axial movement of the pin is stopped when it comes into contact with the surface of the lower workpiece. In contrast to the present invention, all the cited documents teach that, for the establishment of a connection, it is necessary that the tool also enters the lower workpiece. Consequently, also a combination of the cited references could not possible result in a method as defined in present claim 1 so that the invention must also be considered to be unobvious in the light of the cited references.

The dependent claims are directed to features which are considered to be advantageous in connection with the method as claimed in claim 1.

Furthermore, all the dependent claims depend directly or indirectly on claim 1 and consequently include all the features of claim 1 so that they must be considered to be patentable already for that reason.

Reconsideration of the dependent claims is respectfully requested and allowance of claims 1- 8 and 10 is solicited.

Respectfully submitted,



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